Airport Surface Trajectory Based Operations Project Statement of Work

1. Introduction

The Volpe Center has supported the FAA Air Traffic Organization - Operations Planning (ATO-P) organization for ten years for development, prototyping, and evaluation of air traffic management systems for the airport surface and terminal environments. ATO-P is currently preparing for the installation of a Surface Decision Support System (SDSS) demonstration site at Memphis, TN International Airport. As part of the Volpe Center's continuing support for SDSS evaluation, ATO-P requires the procurement of hardware to build the required SDSS architecture.

2. Description

The server cluster consists of two individual server computers – one primary and one standby – for running the SDSS server applications. The server cluster also includes two individual database server computers – one primary and one standby – for running the SDSS Fault Recovery and Playback database.

We specify the following end-state configuration for the SDSS demonstration configuration.

Cluster server node for High Availability (HA) configuration with Storage Area Network (SAN):

Component spec	Requirement
Processor	Dual 64-bit 2.6 GHz quad core processor
OS	Red Hat Enterprise Linux 5
Memory	8 GB of RAM
OS storage space	16 GB mirrored
Application storage space	64 GB on SAN (see spec below)
SAN Host Bus Adapter (HBA)	Fiber channel, SCSI, or SAS HBA
Network interface	Dual 10/100/1000 bit Ethernet card

(NOTE***: The SAN connected to the cluster and database nodes should handle a minimum of four hosts with redundant controllers)

Database server node for a HA configuration with SAN:

Component spec	Requirement
Processor	Single 64-bit 2.6 GHz quad core processor
OS	Red Hat Enterprise Linux 5
Memory	8 GB of RAM
OS storage space	32 GB mirrored
Application storage space	128 GB on SAN (see spec below)
SAN Host Bus Adapter (HBA)	Fiber channel, SCSI, or SAS HBA
Network interface	Dual 10/100/1000 bit Ethernet card

Storage Area Network (SAN):

Component spec	Requirement
Storage	256 GB logical capacity
Redundancy	Mirrored or RAID5

High Availability Software Suite
All server nodes must run the vendor's high availability software application.

The automatic fail-over software for the cluster will be dependent on the server vendor. The requirement is that the server vendor provides a High Availability hardware/software solution, and the acquired hardware must be compatible with the HA software.

3. Configuration Examples

The following are three configuration examples utilizing three different manufacturer's

3.1. Dell

- SAN for Cluster
  - Dell PowerVault MD3000 ***
    - Dual-port SAN controllers for the MD3000 unit
    - 5 36GB 15K RPM SAS 3Gbps 3.5-in Hot/Plug Drive (4 active, 1 Hot Spare)
    - 1 36GB 15K RPM Cold Spare Drive
    - 10 Blank HD fillers

- SAN for Database
  - Dell PowerVault MD3000
    - Dual-port SAN controllers for the MD3000 unit
    - 7 73GB 15K RPM SAS 3Gbps 3.5-in Hot/Plug Drive (6 active, 1 Hot Spare)
    - 1 73GB 15K RPM Cold Spare Drive
    - 8 Blank HD fillers

- Cluster node (for application)
  - Dell PowerEdge 2950 III
    - Dual Quad Core Xeon X5460 3.16GHz
    - Red Hat Enterprise Linux 5 x64 1-2 socket, 3 yr
    - 16GB 667 MHz (4x4GB) Dual Ranked DIMMS
    - Riser with 2 PCI-X/1PCIe slot
    - Rack Chassis with Versa Rails and cable management
    - Redundant Power Supply with Dual Cords
    - PERC 6/i Integrated SAS IR controller (primary controller, RAID 1 mirror)
    - (2) 36GB 15K RPM (for RAID 1 mirror)
    - Dual –External Port SAS 5/E HBA for PowerVault 3000, PCIe (HBA)

- Dual Embedded Broadcom NetXtreme II 5708 Gigabit Ethernet NIC (Offload Engine disabled)
- Dell Remote Access Card, 5th Gen for PowerEdge Remote Management (if not using a Network KVM)
- SAS cables
- Documentation

- Database node (for Oracle Enterprise Edition RAC)
  - Dell PowerEdge 2950 III
    - Dual Quad Core Xeon (E or L)5320 1.8GHz
    - Red Hat Enterprise Linux 5 x64 1-2 socket, 3 yr
    - 8GB 667 MHz (2x4GB) Dual Ranked DIMMS
    - Riser with 2 PCI-X/1PCIe slot
    - Rack Chassis with Versa Rails and cable management
    - Redundant Power Supply with Dual Cords
    - PERC 6/i Integrated SAS IR controller (primary controller, RAID 1 mirror)
    - (2) 36GB 15K RPM (for RAID 1 mirror)
    - Dual –External Port SAS 5/E HBA for PowerVault 3000, PCIe (HBA)
    - Dual Embedded Broadcom NetXtreme II 5708 Gigabit Ethernet NIC (Offload Engine disabled)
    - Dell Remote Access Card, 5th Gen for PowerEdge Remote Management (if not using a Network KVM)
    - SAS cables
    - Documentation

(NOTE***: MD3000 only supports two host in HA configuration, two separate SAN are needed)

3.2. Hewlett Packard

- SAN for Cluster
  - HP StorageWorks MSA1000 ***
    - (2) MSA SAN Switch 2/8
    - HP StorageWorks MSA 30 Dual Bus Modular Smart Array
    - 256MB Cache for standard storage controller
    - 5 36.4GB 15K RPM SAS 3Gbps 3.5-in Hot Plug Drive (4 active, 1 Hot Spare)
    - 1 36.4GB 15K RPM Cold Spare Drive
    - SecurePath for Linux 3.0

- SAN for Database
  - HP StorageWorks MSA1000
    - (2) MSA SAN Switch 2/8
    - HP StorageWorks MSA 30 Dual Bus Modular Smart Array
    - 256MB Cache for standard storage controller
    - 7 72.8GB 15K RPM SAS 3Gbps 3.5-in Hot/Plug Drive (6 active, 1 Hot Spare)
    - 1 72.8GB 15K RPM Cold Spare Drive
    - SecurePath for Linux 3.0
    - 8 Blank HD fillers

- Cluster node (for application)
  - HP ProLiant DL380 G5

- Dual Quad Core Xeon X5460 3.16GHz
- Red Hat Enterprise Linux 5 x64 1-2 socket, 3 yr 9x5 HP Telephone support
- 16GB (4x4GB) PC2-5300 Fully Buffered DIMM
- SlimLine DVD-ROM Drive (8x/24x)
- HP 8 Internal Port 64/133 PCI-X SAS HBA (supports RAID 0, 1 only)
- HP PCI-X/PCI-E Non-Hot Plug Riser Card
- HP 1000W Redundant Power Supply
- HP Redundant Hot-Plug Fans
- HP StorageWorks FC2243 Dual Channel 4 Gb PCI-X 2.0 DC HBA
- (2) HP 36GB Hot Plug 2.5 SAS 15K RPM
- (2) HP 1.83m 10A C13-UL US Power Cords
- FibreChannel cables
- Documentation

- Database node (for Oracle Enterprise Edition RAC)
  - HP ProLiant DL380 G5
    - Dual Quad Core Xeon X5345 2.33GHz
    - Red Hat Enterprise Linux 5 x64 1-2 socket, 3 yr 9x5 HP Telephone support
    - 8GB (2x4GB) PC2-5300 Fully Buffered DIMM
    - SlimLine DVD-ROM Drive (8x/24x)
    - HP 8 Internal Port 64/133 PCI-X SAS HBA (supports RAID 0, 1 only)
    - HP PCI-X/PCI-E Non-Hot Plug Riser Card
    - HP 1000W Redundant Power Supply
    - HP Redundant Hot-Plug Fans
    - HP StorageWorks FC2243 Dual Channel 4 Gb PCI-X 2.0 DC HBA
    - (2) HP 36GB Hot Plug 2.5 SAS 15K RPM
    - (2) HP 1.83m 10A C13-UL US Power Cords
    - FibreChannel cables
    - Documentation

(NOTE***: MSA1000 only supports two host in HA configuration, two separate SAN are needed)

3.3. IBM

- SAN
  - IBM System Storage DS6000
  - IBM TotalStorage SAN16B-2 Express Model
  - 12 73GB 15K RPM SAS 3Gbps 3.5-in Hot/Plug Drive (11 active, 1 Hot Spare)
  - 1 73GB 15K RPM Cold Spare Drive

- Cluster node (for application)
  - IBM xSeries 3650
    - Dual Quad Core Xeon X5460 3.16GHz
    - Red Hat Enterprise Linux 5 x64 1-2 socket, 3 yr
    - 3.5” SAS Hot-Swap Enabled System
    - 16GB 667 MHz (4x4GB) Dual Ranked DIMMS
    - Internal RAID/IBM ServeRAID 8k-I SAS Controller
    - RAID 1 SAS Primary Array
    - (2) 36GB 15K 3.5” Hot-Swap SAS HDD

- CDRW/DVD Combo V ultrabay enhanced
- Remote Supervisor Adapter II SlimLine
- PCI-X Riser card
- Emulex 4GB FC Dual-Port PCI-X HBA
- Redundant Power Supply 835W
- Rack power cable
- FC cables
- Documentation

- Database node (for Oracle Enterprise Edition RAC)
  - IBM xSeries 3650
    - Dual Quad Core Xeon X5345 2.33GHz
    - Red Hat Enterprise Linux 5 x64 1-2 socket, 3 yr
    - 8GB 667 MHz (4x4GB) Dual Ranked DIMMS
    - Internal RAID/IBM ServeRAID 8k-I SAS Controller
    - RAID 1 SAS Primary Array
    - (2) 36GB 15K 3.5" Hot-Swap SAS HDD
    - CDRW/DVD Combo V ultrabay enhanced
    - Remote Supervisor Adapter II SlimLine
    - PCI-X Riser card
    - Emulex 4GB FC Dual-Port PCI-X HBA
    - Redundant Power Supply 835W
    - Rack power cable
    - FC cables
    - Documentation

4. Other items include:

Equipment	Qty
Rackmount keyboard monitor	1
Rackmount 4 port KVM Switch	1
Rackmount UPS - 3,000 VA	2